



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/091,515	03/07/2002	Philip Charles Danby Hobbs	YOR920010496US1	8797
48150	7590	09/16/2005		
MCGINN INTELLECTUAL PROPERTY LAW GROUP, PLLC 8321 OLD COURTHOUSE ROAD SUITE 200 VIENNA, VA 22182-3817				
			EXAMINER SONG, SARAH U	
			ART UNIT 2874	PAPER NUMBER

DATE MAILED: 09/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/091,515

Applicant(s)

HOBBS ET AL.

Examiner

Sarah Song

Art Unit

2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-47 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-47 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 May 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

## DETAILED ACTION

### *Drawings*

1. This application has been filed with nine (9) sheets of drawings, which have been approved by the Examiner.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1-5, 10-16, 21-23, 34, 37, 39, 46 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moddel et al. (U.S. Patent 6,563,185).**
4. Regarding claim 1, 39 and 46, Moddel et al. discloses an apparatus for producing a modulated optical signal, comprising an antenna (e.g. 222A, 223A) for communicating with a waveguide and with an externally-applied optical field (e.g. 202A) and having an output port; and an electrically-variable-impedance device connected at the output port of the antenna, capable of responding at a frequency of an externally-applied optical field and having its impedance at the optical frequency changed by an applied electrical signal (i.e. voltage). See column 14, lines 32-53. Moddel et al. also discloses the device capable of responding to more than one frequency to radiate a mixing product between the optical frequencies. See column 14, lines 4-31.
5. Regarding claims 12 and 47, Moddel et al. also discloses an apparatus for detecting an optical signal, comprising an antenna structure (e.g. 20B, 21B) having an output port; and an

Art Unit: 2874

electrically-connected detector connected at the antenna's output port, capable of responding at a frequency of the optical signal in a waveguide and for producing a detected electrical signal at baseband. See column 3, lines 17-41. Moddel et al. also discloses the device capable of responding at more than one frequency producing a detected electrical signal at a frequency corresponding to a mixing product of the optical frequencies. See column 20, line 67 through column 21, line 30.

6. Moddel et al. does not expressly disclose a waveguide. However, waveguides are well known in the art for providing low loss propagation of optical signals. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a waveguide in communication with the antenna of Moddel et al. in order to provide low loss propagation of the optical signal to or from the device.

7. Regarding claims 2-4, 10, 11, 13-15 and 21-23, the electrically-variable-impedance device comprises a tunnel junction, wherein the tunnel junction comprises a metal-insulator-metal (MIM) structure. More specifically, the MIM tunnel junction comprises closely juxtaposed metal lines with a layer of metal oxide therebetween. See column 7, line 50 through column 8, line 6. Additionally, the electrically-connected detector comprises a semiconductor tunnel junction. See column 16, lines 65-67. Furthermore, Moddel et al. discloses the device may comprise a metal-insulator-superconductor barrier. See column 6, lines 51-53.

8. Regarding claims 5 and 16, Moddel et al. does not expressly disclose the metal line comprising nickel and the oxide comprising nickel oxide. Nickel and nickel oxide were known in the art at the time of the invention as a suitable material for a MIM tunnel junction for an optical device. Therefore, it would have been obvious to one having ordinary skill in the art at

Art Unit: 2874

the time the invention was made to provide nickel and nickel oxide in the MIM tunnel junction of Modell et al. since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. See MPEP 2144.07.

9. Regarding claims 6 and 17, Modell et al. discloses the area of the junction to range from sub-microns up to hundred of microns but does not expressly disclose the area of the junction to be less than 100 nm square. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the claimed dimension in order to provide a wavelength specific device since Modell et al. teaches that scaling antenna dimensions affects the wavelength range of the device.

10. Regarding claims 7 and 18, Modell et al. does not expressly disclose a capacitance to be less than 100 attofarads. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a capacitance of less than 100 attofarads since it has been that discovering optimum or workable ranges involves only routine skill in the art. See MPEP 2144.05(II)(A)(B).

11. Regarding claims 8, 9, 19 and 20, Modell et al. does not expressly disclose a Josephson junction or a Schottky barrier. Josephson junctions and Schottky barriers were well known in the art for tunneling devices at the time of the invention. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide any well known tunneling junction since applicant has not disclosed that the particular junction solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with any type of tunneling optical device.

Art Unit: 2874

12. Regarding claims 24 Model et al. discloses an apparatus comprising a transmitting antenna (e.g. 120C, 121C) for communicating with a waveguide and having an output port; and an electrically-variable-impedance device connected at the output port of the transmitting antenna, capable of responding at a frequency of an externally-applied optical field and having its impedance at the optical frequency changed by an applied electrical signal (i.e. voltage). See Figures 2B and 2C. Model et al. also discloses an apparatus comprising a receiving antenna structure (e.g. 20B, 21B) having an output port; and an electrically-connected detector connected at the antenna's output port, capable of responding at a frequency of the optical signal in a waveguide and for producing a detected electrical signal at baseband. See Figures 1A and 1B.

13. Model et al. does not expressly disclose a waveguide in communication with both the transmitting and receiving antennae. However, waveguides are well known in the art for providing low loss propagation of optical signals. Furthermore, Model et al. discloses that the devices may be combined to have applications in integrated circuits. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a waveguide in communication with the antennae of Model et al. (e.g. in an integrated circuit) in order to provide low loss propagation of the optical signal from and to the antennae in a compact device.

14. Regarding claims 25-27, 33 and 34, Model et al. discloses a source of optical radiation incident on the transmitting antenna by unguided propagation (performed above a top surface of said waveguide). See Figure 3A. Although guided propagation (e.g. along said waveguide) of the optical radiation incident on the antenna is not expressly disclosed, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide

Art Unit: 2874

guided propagation since it was known in the art to guide the optical radiation around any additional components of an integrated circuit.

15. Regarding claims 28-30, the method claims would also have been obvious as setting forth requisite steps for operation of the devices as discussed above.

16. Regarding claims 31, it is noted that a portion of the externally-applied optical field is scattered (as a result of modulation) within said waveguide.

17. Regarding claims 36 and 37, Model et al. appears to disclose direct detection. However, coherent detection was also known in the art as an alternative to direct detection and therefore would have been obvious to one of ordinary skill in the art.

18. Regarding claim 32, 35, 38 and 40-45, Model et al. disclose various applications for the devices in place of prior art semiconductor devices, which were known in the art to be utilized in fiber LANs, optical backplanes comprising circuit boards, chip modules, communication systems comprising a plurality of interconnects for one-to-many or many-to-many connections.

Therefore, the incorporation of the device of Model et al. in to the various prior art systems would have been obvious in order to provide advantages of speed, simplified input/outputs, and ease of fabrication as taught by Model et al. See column 20, lines 38-67.

### ***Conclusion***

19. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

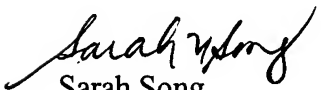
Art Unit: 2874

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sarah Song whose telephone number is 571-272-2359. The examiner can normally be reached on M-Th 7:30am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on 571-272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Sarah Song  
Patent Examiner  
Group Art Unit 2874